Concrete Batch Plant Inspection Check List

Washington State
Department of Transportation
Materials Laboratory

Introduction

The Washington State Department of Transportation(WSDOT) Concrete Batch Plant Inspection Program is an annual inspection of each producer's concrete batching facility. The program is established to insure the production of quality concrete, meeting the specifications of the Washington State Department of Transportation. The inspection program reflects the current concrete specifications and the absence of a state inspector at the batch plant during production. The program includes a more complete inspection procedure for transit mix trucks.

This manual is intended to provide guidance to ready-mixed concrete producers in readying their production facilities for inspection by the Washington State Department of Transportation. The qualification inspection reflects many of the same elements covered by the NRMCA inspection check list and other widely accepted standards regarding proper concrete batching.

Any ready-mixed concrete producer desiring qualification and Inspection of their production facilities will be supplied free of charge, one copy of this Inspection Check List for each plant to be inspected. The check list contains a list of elements to be inspected and the methods to be used in checking the various elements, a Check List of facility requirements and Inspection Record of Truck Fleet form. When properly executed, this check list and supporting documents will establish eligibility for Approval of the batching facilities.

When completed and signed by the Region Materials Engineer and approved by the State Materials Engineer the check list will be the basis of the Batch Plant Approval. The program has two levels of Approval.

For Contracting Agency provided mix designs (section 6-02.3(2)c) and Producer designed mixes on a continuing basis the total check list must be completed annually. For producer designed mixes for use on a single contract the checklist inspection must have been completed within the preceding two years and the scale certification must be current. Only plants meeting the requirements for contracting agency provided mixes will be provided with a Concrete Batch Plant Inspection Certificate. Single contract approval will be in letter form. The Batch Plant Approval will be for a maximum of six months or six months after the latest scale certification/service date whichever occurs first.

The Concrete Batch Plant Approval will automatically be extended for an additional six months upon receipt, at the Field Operations Support Service Center, of a re-inspection or servicing of the scales by a scale service company. The completed check list will be on file at the Field Operations Support Service Center along with other supporting documents relating to the Inspection of the scales, water meters and inspection records of the transit mix trucks and material sources.

The Qualification inspection will be conducted by the Region Materials Engineer or their designated representative. The producer's personnel should work with the engineer to expedite his inspection and, where possible, to correct deficiencies prior to completion of the inspection.

The Region Materials Engineer or their designated representative will inspect all items covered by the check list and execute one copy of the forms as indicated for each plant considered for certification. Each element on the check list will be examined for conformance. A "YES", "NO" or "N/A' answer will be entered for each element. If the check list item is answered "NO", indicating non-compliance, an appropriate explanatory note will be added to clarify the reason for or degree of noncompliance; however, a production facility not meeting the required items will not be approved. The minimum elements listed in the Qualification Chart must be in compliance for each type of production facility and proposed mixes to be provided. Each page of the check list and any appended notes for each section of the check list must be initialed by the inspecting engineer or Region Materials Engineer. Their signature must appear on the Section 11 - Inspection Verification, page IV, along with the other information indicated, including the specific designation of the plant and the date of the inspection. The "Section I - Facility Identification" (page 3) and the "Section 11 - Inspection Verification" (page IV) and the completed check list will be submitted to the Field Operations Support Service Center for Approval. A copy of the approved Inspection check list will be returned to the Producer and the Region Materials Engineer, indicating the action taken by Field Operations Support Service Center.

Washington State Department of Transportation

Concrete Batch Plant Inspection Check List

Facility Identification

Name of Producer

Mailing Address

City	State	Zip Code

Plant Location

City	State	Zip Code

Quality Control Manager

Plant Manufacturer

Manufacturer's Rated Capacity Per Batch cu. yd.	Manufacturer's Rated Production Capacity Per Hour cu. yd.

Scale Certified / Service Record

	Cement	Aggregate	Water Batcher	Water Meter
Scales Type				
Read Out Type				
Capacity (In pounds)				
Date Certified/Serviced				

Aggregate Sources

Fine Aggregate PS- _____ PS- _____

Coarse Aggregate PS- _____ PS- _____

Complete a Request for Approval of Material (DOT Form 350-071 EF) for all Sources of Cement, Flyash, and Admixtures

Plant Configuration Information

Cement Storage Silos for - State Type II Cement ☐ Yes ☐ No

Flyash ☐ Yes ☐ No

Aggr. Stockpiles Separated by - Individual Piles ☐ Yes ☐ No

Bunkers With Walls ☐ Yes ☐ No

Aggregate Silos ☐ Yes ☐ No

Wind and/or Freeze Protection for - Cement Weigh Batcher ☐ Yes ☐ No

Aggregate Weigh Batcher ☐ Yes ☐ No

Admix. Storage & Piping ☐ Yes ☐ No

Contract Information

Contract Number	Federal Aid Number	State Route Number

Project Title

Section II - Inspection Verification

The Materials Engineer of the _____ Region has conducted the inspection of the aforementioned ready-mixed concrete production facilities and asserts that, in his or her professional judgment, compliance with all of the applicable items on the check list is complete except as noted below. Application is hereby made for issuance of an approval for this production facility to be classified as follows:

General Operation

- ☐ Transit Mix
- ☐ Central Mix
- ☐ Shrink Mix

Batching System

- ☐ Manual Batching System
- ☐ Semi-Automatic Batching System
- ☐ Partial Automatic Batching System
- ☐ Automatic Batching System

Remarks:

Recommended Restrictions:

Region Materials Engineer Stamp

Region Materials Engineer _____

Inspecting Party _____

Washington State Department of Transportation

Concrete Batch Plant Inspection Check List

1. Material Storage and Handling

1.1 Cement

1.1a	Bins or silos tight and provide for free movement to discharge opening.	☐ Yes ☐ No ☐ N/A
1.1b	Where storage is provided for different types of cement or cementitious materials, each material is isolated to prevent intermingling or contamination.	☐ Yes ☐ No ☐ N/A
1.1c	Equipped with a suitable means or device for obtaining a representative sample of cement. The sample shall be taken in close proximity to the cement weigh hopper and from a container or conveyor holding only cement.	☐ Yes ☐ No ☐ N/A

1.2 Aggregates

1.2a	Procedures for unloading aggregates such as to prevent harmful segregation and breakage.	☐ Yes ☐ No ☐ N/A
1.2b	Procedures for building stockpiles such as to prevent harmful segregation and breakage.	☐ Yes ☐ No ☐ N/A
1.2c	Stockpiles located to prevent contamination; arranged to assure that each aggregate as removed from its stockpile is distinct and not intermingled with others.	☐ Yes ☐ No ☐ N/A
1.2d	Intra-plant handling and transportation such as to prevent harmful segregation.	☐ Yes ☐ No ☐ N/A
1.2e	Separate storage bins or compartments for each size and type of aggregate properly constructed and charged to prevent mixing of different sizes or types.	☐ Yes ☐ No ☐ N/A

1.3 Water

1.3a	Adequate supply, with pressures sufficiently constant or regulated to prevent interference with accuracy of measurement.	☐ Yes ☐ No ☐ N/A
1.3b	Hot water available in sufficient quantity for cold weather operation. One boiler horsepower = 33,500 BTU per hour transferred to the water (See Notes 1 and 2).	☐ Yes ☐ No ☐ N/A

What is the rated capacity of Boiler: _____

Note 1:	When concrete is placed regularly during subfreezing weather, a minimum heating capacity is required for water and/or aggregate of 15 boiler horsepower per 100 cubic yards of average daily cold weather production. (May be reduced to 1- bhp if storage capacity permits round-the-clock operation of heating equipment.)
Note 2:	If this requirement is not met and the facility is in an area where NOAA weather records show an average of more than 5 days per year when the minimum temperature is 32^{O} F or below, the Concrete Batch Plant Inspection Certificate will carry the notation that the "Facility does not meet all requirements for furnishing concrete in subfreezing weather."

1.3c	Source of water sufficiently free of harmful chlorides or sulfates. (Sample water if source has changed in past twelve months.)	☐ Yes ☐ No ☐ N/A

1.4 Admixtures

1.4a	Storage and handling systems for liquid admixtures sufficiently protected to prevent freezing of admixtures at any time. (Freezing can cause ingredients of some liquid admixtures to separate and therefore, affect concrete quality control.)	☐ Yes ☐ No ☐ N/A
1.4b	Admixtures protected to prevent damage from contamination.	☐ Yes ☐ No ☐ N/A
1.4c	Agitation provided for liquid admixtures that are not stable solutions. (Microsilica slurry.)	☐ Yes ☐ No ☐ N/A

Initials of Region Materials Engineer or Designated Representative _____

2. Batching Equipment

2.0 Scales

2.0	Commercial Scale Certificate or Service Check (See Section 2.5 for operating range that scale certification must address.) (See Note 3) If "Yes" then go to Section 2.2, else go to Section 2.1a.	☐ Yes ☐ No ☐ N/A
2.1a	Each scale comprised of a suitable system of levers or load cells which will weigh consistently within the tolerance given in 2.1b, with load indicated either by means of a beam with balance indicator, full-reading dial, or a digital read-out or display. For all types of batching systems, manual through automatic, the batch person must be able to read the load indicating devices from his/her normal station. Where the controls are remotely located with respect to the batching equipment, monitors or scale-follower devices may be used if they repeat the indication on the master scale within ± 0.20 percent of scale capacity.	☐ Yes ☐ No ☐ N/A
2.1b	Each scale accurate (See Note 3) within ± 0.20 percent of scale capacity throughout the range of use. For direct digital read-out, the tolerance shall be increased to ± 0.25 percent to allow for tracking restriction. (See Note 4)	☐ Yes ☐ No ☐ N/A
2.1c	At least 500 pounds of certified test weights (accurate to within ± 0.01 percent) readily available for checking accuracy of scales. Company official agrees to recheck scales not less frequently than every 6 months and arrange for prompt recalibration and correction in accordance with 2.1b if the plant is moved or noncompliance is indicated in the 6 month rechecking. Signed statement by responsible official is attached: See "Agreement to regularly Check Scales". (See Note 5)	☐ Yes ☐ No ☐ N/A
2.1d	Lever system scales so designed that center of gravity of gross load always lies between load pivots.	☐ Yes ☐ No ☐ N/A

Note 3:	The engineer supervising inspection may accept scale calibrations made by commercial scale service companies, if these calibrations demonstrate compliance with the requirements of Section 2.1 and subsections. A copy of the Scale Certification or Check should be submitted with this check list.
Note 4:	The purpose of this increased tolerance is to allow for the fact that digital readings are limited to whole-number values which cannot reproduce weight indications closer than ± 0.05 percent of capacity.
Note 5:	The purpose of the Agreement to Regularly Check Scales is to assure awareness by the operator of the necessity to verify weighing accuracy continuously. Checks may be made by qualified plant personnel or by outside agencies or scale companies. The availability of test weights is considered essential to fulfillment of the agreement, but the engineer may consider that, where a company operates several plants, a separate set of test weights is not needed for each.

2.1e **Beam-Indicating Scales**

2.1f(1)	Provide with zero balance beam, balance indicator, and separate weighing beam for each ingredient of a batch to be weighed on the same scale.	☐ Yes ☐ No ☐ N/A
2.1f(2)	Beam poises corrosion resistant, equipment with positive and accurate holding devices, and capable of being set to the minimum graduated interval which shall be not greater than 0.1 percent of capacity with a clear interval of not less than 0.03 inches.	☐ Yes ☐ No ☐ N/A
2.1f(3)	Balance indicators sufficiently sensitive to show movement when weight corresponding to 0.10 percent of scale capacity is placed in the batch hopper at a load equal to or above 50 percent of scale capacity; pointer travel of balance indicators at least 5 percent of net-rated capacity of largest weigh beam or 200 pounds, whichever is less, for underweight and 4 percent or 100 pounds, whichever is less, for, for overweight; provision made for damping oscillation of indicator pointer.	☐ Yes ☐ No ☐ N/A

Initials of Region Materials Engineer
or Designated Representative _____

2. Batching Equipment

2.0 Scales (Continued)

2.1g Dial-Indicating Scales

2.1g(1)	Dial head mechanism enclosed so as to be dust tight.	☐ Yes ☐ No ☐ N/A
2.1g(2)	Dials indicate load in batch continuously from zero balance to full weighing capacity of the scale.	☐ Yes ☐ No ☐ N/A
2.1g(3)	Dial faces have minimum of 1000 graduations on circular reading line at clear interval of not less that 0.03 inches.	☐ Yes ☐ No ☐ N/A
2.1h	**Digital-Indicating Scales**: Digital Indicator or display protected from dust with numbers large enough for good readability; minimum numerical increment equal to or less than 0.1 percent of scale capacity.	☐ Yes ☐ No ☐ N/A
2.1i	**Load-Cell Scales**: Arranged to transmit load to one or more cells, directly or through a system of levers, in such a way that the cell system registers the entire load accurately on the load-indicating device; load cells indicated by manufacturer to be accurate throughout the range of temperatures to which normally exposed during plant operation.	☐ Yes ☐ No ☐ N/A

2.2 Weigh Batchers

2.2a	Batchers for weighing cement, aggregates, and also water or admixtures (if measured by weight) consist of suitable containers freely suspended from scale, equipped with necessary charging and discharging mechanisms.	☐ Yes ☐ No ☐ N/A
2.2b	Cement and other cementitious materials weighed on scales and in weigh hoppers which are independent of scales and weigh hoppers used for non-cementitious ingredients.	☐ Yes ☐ No ☐ N/A
2.2c	Batchers capable of receiving rated load without contact of the weighted materials with the charging mechanism.	☐ Yes ☐ No ☐ N/A
2.2d	Provide for removal of overload.	☐ Yes ☐ No ☐ N/A
2.2e	Cement batchers provided with dust seal between charging mechanism and hopper, installed in such a way as not to affect weighing accuracy; weigh hopper vented to permit escape of air; hopper self-cleaning and fitted with means to assure complete discharge.	☐ Yes ☐ No ☐ N/A
2.2f	Batcher charging mechanism capable of stopping flow of material within batching tolerances specified in Section 2.5 and preventing loss of material when closed.	☐ Yes ☐ No ☐ N/A
2.2h	Vibrators or other appurtenances installed in such a way as not to affect accuracy of weighing.	☐ Yes ☐ No ☐ N/A
2.2i	Wind protection sufficient to prevent interference with weighing accuracy.	☐ Yes ☐ No ☐ N/A

2.3 Volumetric Batching Devices for Water

2.3a Water Meters

2.3a(1)	Equipped with a cut-off device capable of stopping the flow within the tolerances specified in Section 2.5c; cut-off device free from leaks when closed.	☐ Yes ☐ No ☐ N/A
2.3a(2)	Equipped with a volume setting device capable of being set to increments at least as small as one gallon or a register capable of being read to one gallon, or both (See Note 6).	☐ Yes ☐ No ☐ N/A
2.3a(3)	Provide and indication, visible to the batch operator, of the volume batched at any point in the metering operation.	☐ Yes ☐ No ☐ N/A

2. Batching Equipment

2.3 Volumetric Batching Devices for Water (Continued)

2.3b **Volumetric Tank Water Batchers**

2.3b(1)	Equipped with necessary filling and discharge valves which are leak free when closed; fill valve capable of stopping flow within the tolerance specified in Section 2.5c.	☐ Yes ☐ No ☐ N/A
2.3b(2)	Have a gauge or other device in the view of the batch operator which indicates the volume of water in the tank from the zero point to capacity of the batcher and which can be read to one gallon (See Note 6); tank equipped with an overflow pipe at batcher capacity lever if it is less than tank capacity.	☐ Yes ☐ No ☐ N/A
2.3b(3)	Equipped with a valve to remove overloads.	☐ Yes ☐ No ☐ N/A

Note 6: For water-measuring equipment which is graduated in terms of pounds instead of gallons, use 10 pounds as the basic increment instead of one gallon.

2.4 Dispensers for Liquid Admixtures (See Note 7)

2.4a	Separate dispenser for each liquid admixture on regular use, except that more than one admixture can be batched through a single dispenser if the admixtures are compatible or if the dispenser is flushed with water after each cycle (See Notes 8 and 9).	☐ Yes ☐ No ☐ N/A
2.4b	Piping free of leaks and properly valved to prevent back flow or siphoning and to insure that the measured amount is discharged.	☐ Yes ☐ No ☐ N/A
2.4c	Each volumetric dispenser provided with an accurately calibrated container in which the admixture may be collected when it is desired to check the accuracy of measurement as indicated in Section 2.5 (See Note 10).	☐ Yes ☐ No ☐ N/A
2.4d	For admixtures used at less than 50 ounces per 100 pounds of cement, each volumetric dispenser equipped with a visual or other means of providing a gross check to the batch operator of the amount of admixture batched during each cycle, within $\pm$ 20 percent. The gross check shall be independent of the accuracy, function, or operation of the primary metering device (See Note 11).	☐ Yes ☐ No ☐ N/A
2.4e	Volumetric admixture dispensers provide visible indication of the quantity batched or interlock cut-off when liquid admixture supply is not available to the dispenser (This is to prevent dispensing air instead of admixture).	☐ Yes ☐ No ☐ N/A

Note 7: The engineer supervising inspection may accept Certification from the Admixture Supplier that the dispensing equipment is in good operating condition and accurate, meeting the requirements of Section 2.2.

Note 8: A Dispenser is a device for batching liquid admixtures by weight or volume and must be affixed to the plant. Dispensing methods which involve hand-carried containers for the measurement and discharge of admixtures do not qualify. Volumetric dispenser requirements are i Section 2.4 and dispensers which are weigh batchers must meet the applicable requirements of Section 2.2.

Note 9: If more than one admixture is being used through a single dispenser without flushing of the dispenser with water after each cycle, the engineer should ascertain that the admixtures in actual use are compatible with each other and that the mixing of the admixtures prior to introduction into the concrete will not be detrimental.

Note 10: When the company operating the batch plant or delivery units regularly batches an admixture at the job site, the dispenser must comply worth the requirements of Section 2.4 and subsection 2.5d. Occasional addition of admixtures at the job site to adjust entrained air content, etc., are not subject to dispenser requirements of Section 2.4.

Initials of Region Materials Engineer
or Designated Representative _____

2. Batching Equipment

2.4 Dispensers for Liquid Admixtures (Continued)

Note 11: This gross check is required to help the batch operator prevent large overdoses or deficiencies of admixture due to dispenser malfunction in any batch, which could cause great changes in fresh and/or hardened concrete properties. Following are examples of how the gross check might be provided: (a) Collecting the measured quantity of admixture in a calibrated container during each cycle and holding it for a short period to permit a visual check: (b) Measuring the dispensed quantity through the use of and independent meter to obtain a rough check on the amount measured by observation of a volumetric indicator. Admixtures used at rates if 50 ounces per 100 pounds of cement or greater are exempt from the independent check required in Section 2.4d. Silica fume slurry and some other admixtures may be used at rates exceeding 50 ounces per 100 pounds of cement.

2.5 Accuracy of Plant Batching (See Note 12)

2.5a	Cement and other cementitious materials measured by weight within ± 1 percent of the desired weight* in individual batchers, or ± 1 percent of the desired intermediate and final cumulative weights* in cumulative batchers, but in either case, the minimum accuracy of the batching applying to small loads is ± 0.3 percent of scale capacity (which governs for weights below 30 percent of scale capacity).	☐ Yes ☐ No ☐ N/A
2.5b	Aggregate measured by weight within ± 2 percent of the desired weight* in individual aggregate batchers, or ± 1 percent of the desired intermediate and final cumulative weights* in cumulative aggregate batchers, in either case, the minimum accuracy of batching applying to small loads is ± 0.3 percent of scale capacity (which governs for weights below 15 percent and 30 percent of scale capacity, respectively). See Notes 13 and 14.	☐ Yes ☐ No ☐ N/A
2.5c	Water measured by volume or weight within ± 1.5 percent** of the desired amount*, or ± 1 gallon (See Note 5), whichever is greater. Company official agrees to recheck accuracy of volumetric water batching devices (including water meters) not less frequently than every 6 months.	☐ Yes ☐ No ☐ N/A
2.5d	Admixtures measured to within + 3 percent of the desired amount*, or + the minimum dosage rate per 100 pounds of cement, whichever is greater (See Note 15). Company official agrees to recheck batching accuracy of volumetric admixture dispensers at least every 6 months. See Agreement to Regularly Check Scales.	☐ Yes ☐ No ☐ N/A
2.5e	Compensation for free moisture on aggregate as it affects aggregate weights and slump control:	
2.5e(1)	Suitable combination of pre-batching storage and manual or automatic, measurement of aggregate moisture to provide aggregate of fairly consistent moisture content to the batcher and to detect changes of 1 percent on the moisture content of fine aggregate; procedure for adjustment of aggregate batch weights for changes in their moisture content of 1 percent by weight of dry aggregate.	☐ Yes ☐ No ☐ N/A
2.5e(2)	Suitable procedures for maintaining control of slump (See Note 16).	☐ Yes ☐ No ☐ N/A

* As indicated to the batch operator, corrected for aggregate moisture, if required.
** This corresponds approximately to an accuracy of ± 1 percent based on total mixing water for typical aggregate moisture levels.

2. Batching Equipment

2.5 Accuracy of Plant Batching (Continued)

Note 12:	For weighed ingredients, accuracy of batching so determined by comparison between the desired weight* and the actual scale reading; for volumetric measurement of water and admixtures, accuracy is determined by checking the discharged quantity either by weighing on a scale or by volume in accurately calibrated container. The completion of a Batching Process Verification for Ready Mix Concrete check list may be used in lieu of completing Sections 2.5a thru 2.5d.
Note 13:	If the weight-setting system provides compensation for moisture on aggregates, the tolerance applies to the accuracy of the measurement of the corrected weight.
Note 14:	In some instances the accurate control of concrete containing light-weight aggregate is more feasible if the lightweight coarse aggregate ins batched by bulk volume rather than by weight. When this is judged to be the case, the provisions of Section 2.5b can be waived for lightweight coarse aggregate.
Note 15:	Liquid admixtures are to be measured by volume or weight and powdered admixtures are to be measured by weight. Where it cannot be determined what liquid admixture will normally be used in a volumetric dispenser, assume that the dosage will be at a rate of at least 1 ounce per 100 pounds of cement; admixtures with lower rates can be reconstituted to the point where the rate is 1 ounce per 100 pounds of cement.
Note 16:	For central, shrink, or truck mixing operations, this can be a visual or other method of estimating the slump of the concrete during mixing with consequent adjustments in added water made by the batch operator or truck mixer operator; as an alternative, slump can be controlled by a method based on determination of aggregate free moisture to an accuracy of about ± 1 1/2 gallons per cubic yard of concrete so that the correct amount of added water can be batched to obtain the desired slump.

2.6 Batching Systems

2.6a Definitions and Requirements of Component Individual Batcher Control. Batching controls are the part of the batching equipment that provides means for operating the batching device for an individual material. They may be mechanical, hydraulic, pneumatic, electrical, or a combination of these means. A Batching system is a combination of batching devices and batching controls necessary to accurately and consistently batch concrete ingredients in desired proportions. Normally a batching system would include batching devices and controls for cement, aggregates, water, and admixtures. Some may not include admixtures if they are not used at the plant or may not have batching equipment for water if it is entirely batched through the truck mixer water system.

2.6a(1) Weigh Batcher Controls (Cement and aggregates must be batched by weight; water and admixtures may be batched in a weight batcher or by volume in a volumetric device covered in Section 2.6a(2). For lightweight coarse aggregate, see Note 14). ☐ Yes ☐ No ☐ N/A

2.6a(1)(1) Manual Control - Manual weigh batcher control exists when the batching devices are actuated manually, with the accuracy of the batching operation dependent on the operator's observation of a scale. The batching device may be actuated by hand or by hydraulic, pneumatic, or electrical power assists. ☐ Yes ☐ No ☐ N/A

2.6a(1)(2) Semi-Automatic Control - When actuated by a starting mechanism, a semi-automatic weigh batcher control shall start the weighing operation of the material and stop the flow automatically when the designated weight has been reached. No interlocks are required. ☐ Yes ☐ No ☐ N/A

2.6a(1)(3) Semi-Automatic Interlocked Control - When actuated by a starting mechanism, a semi-automatic interlocked weigh batcher control shall start the weighing operation of the material and stop the flow automatically when the designated weight has been reached. It shall be interlocked to assure that the discharge mechanism cannot be opened until the weight is within the tolerance specified is Section 2.5. ☐ Yes ☐ No ☐ N/A

2. Batching Equipment

2.6 Batching Systems (Continued)

2.6a(1)(4) Automatic Control - When actuated by a single starting signal, an automatic weigh batcher control shall start the weighing operation of the cement, aggregate, water, or admixture, and stop the flow automatically when the designated weight has been reached. It shall be interlocked to assure that: ☐ Yes ☐ No ☐ N/A

(b) The charging gate or valve cannot be opened until the scale has returned to zero balance within ± 0.3 percent of the scale capacity; ☐ Yes ☐ No ☐ N/A

(b) The charging gate or valve cannot be opened if the discharge mechanism is open; ☐ Yes ☐ No ☐ N/A

(c) The discharge mechanism cannot be actuated if the charging gate or valve is open, and; ☐ Yes ☐ No ☐ N/A

(d) The discharge mechanism cannot be actuated until the weight of material is within the tolerance specified in Section 2.5. ☐ Yes ☐ No ☐ N/A

Note 17: Any weigh batcher control which does not fully meet the requirements for semi-automatic, semi-automatic interlock, or automatic weigh batcher controls is considered manual if it can be operated to meet the requirements of this section.

2.6a(2) Volumetric Batching Device Controls (This pertains to the controls used for measurement of admixtures in a volumetric admixture dispenser of the measurement of water with a water meter or volumetric batcher tank.)

2.6a(2)(1) Manual Control - Manual volumetric batcher control for water or admixtures exists when the volumetric measuring device is actuated manually with the accuracy of the measuring operation being dependent on the operator's visual observation of a volumetric indicator (Such as a digital meter display or sight gauge) and has manual cut-off of the flow at the desired volume. The flow of the liquid may be controlled by hand or by pneumatic, hydraulic, or electrical power assists (See Note 18). ☐ Yes ☐ No ☐ N/A

2.6a(2)(2) Automatic Control - When actuated by a single starting signal, an automatic volumetric control shall start the measuring operation and stop the flow automatically when the designated volume has been reached. ☐ Yes ☐ No ☐ N/A

Note 18: Any volumetric control which does not fully meet the requirements for automatic volumetric controls is considered manual if it can be operated to meet the requirements of this section.

2.6.2 System Requirements

2.6.2a Manual System - A combination of the necessary individual weigh batchers and volumetric batching devices (if any volumetric measuring of water or admixture is performed at the plant) to proportion concrete properly, the controls of which are all manual with the possible exception of semi-automatic or automatic controls for admixture and/or water. ☐ Yes ☐ No ☐ N/A

2.6.2b Partially Automatic System - A combination of the necessary individual weigh batchers and volumetric devices (if any volumetric measuring of water or admixture is performed at the plant), the controls of which are a combination of manual, semi-automatic, semi-automatic interlocked, and automatic controls not meeting the requirements of semi-automatic or automatic systems below; at least one of the non-manual controls shall be for controlling the batching of cement or aggregates. ☐ Yes ☐ No ☐ N/A

2. Batching Equipment

2.6.2 System Requirements (Continued)

2.6.2c Semi-Automatic System - A combination of the necessary individual weigh batchers and volumetric devices (if water or admixture is measured volumetrically), the controls of which are either all semi-automatic interlocked, a combination of semi-automatic interlocked and automatic, or all automatic controls (In accordance with Section 2.6.2a, 2.6.2b pr 2.6.2d but not meeting all the system requirements for the automatic system as given in Section 2.6.2d. ☐ Yes ☐ No ☐ N/A

2.6.2d Automatic Control - A combination of the necessary individual weigh batchers and volumetric batching devices (If water or admixture is measured volumetrically), the controls of which are all automatic controls (In accordance with Section 2.6.2d or Section 2.6.2b and meet the all of the following automatic system requirements: ☐ Yes ☐ No ☐ N/A

(1) All batching equipment activated by a single starting mechanism, except that a separate starting mechanism is permitted for volumetric batching of water and/or admixture not batched at the time of weighing the other ingredients. ☐ Yes ☐ No ☐ N/A

(2) The discharge of any weighed ingredient into the system may not be started unless batching controls for all weigh batchers have been cleared of the previous batch, with scales returning to zero tolerance, and until all weighed ingredients have been weighed within the required tolerances. ☐ Yes ☐ No ☐ N/A

(3) Volumetric admixture dispenser controls (If any) interlocked with volumetric water batching controls or controls of at least one weigh batcher to prevent the discharge of both admixture and the interlocked ingredient(s) unless both the admixture dispenser and interlocked batching device(s) have been cleared of the previous batch. ☐ Yes ☐ No ☐ N/A

2.7 Recorders

2.7a Definition: Devices which provide a permanent record of the quantity of cement, aggregate, or water measured into a particular batch of concrete.

They Shall:

2.7b Provide for identifying the particular batch with the corresponding delivery ticket. ☐ Yes ☐ No ☐ N/A

2.7c Register empty balance. ☐ Yes ☐ No ☐ N/A

2.7d Register the quantity of ingredient or ingredients batched. ☐ Yes ☐ No ☐ N/A

2.7e In the case of graphical recorders, register scale readings within ± 2 percent of total scale capacity. ☐ Yes ☐ No ☐ N/A

2.7f In the case of the photographic or digital recorders, reproduce the scale reading within ± 0.1 percent of scale capacity. ☐ Yes ☐ No ☐ N/A

Initials of Region Materials Engineer
or Designated Representative _____

Qualification Chart for Ready Mixed Concrete Plants

Based upon submission of a properly executed **Concrete Batch Plant Inspection Check List**, a certificate will be furnished by the Washington State Department of Transportation, to be signed by the responsible Region Materials Engineer:

(1) The general operating method of the ready mixed concrete plants as **Transit Mix**, **Central Mix**, or **Shrink Mix**.

(2) The batching system as **Manual**, **Partially Automatic**, **Semi-Automatic**, or **Automatic**.

(3) If recording is provided, to what extent.

Certification for a given classification requires adherence to all items designated on the chart below. by “X” except that “N” for “Not Applicable” is permissible in certain cases where such permissibility is implicit in the item itself (e.g., “N” would be appropriate for 1.3b in seasonal operation climates since concrete would never be delivered in freezing temperatures. Similarly, the requirements for beam-indicating scales in 2.1.5 would “not apply” in a plant having only dial-indicating scales.).

Check List Items	Transit Mixing				Shrink Mixing				Central Mixing			
	Manual	Partial Automatic	Semi-Automatic	Automatic	Manual	Partial Automatic	Semi-Automatic	Automatic	Manual	Partial Automatic	Semi-Automatic	Automatic
1.	X	X	X	X	X	X	X	X	X	X	X	X
2.1	X	X	X	X	X	X	X	X	X	X	X	X
2.2	X	X	X	X	X	X	X	X	X	X	X	X
2.3	X	X	X	X	X	X	X	X	X	X	X	X
2.4	X	X	X	X	X	X	X	X	X	X	X	X
2.5	X	X	X	X	X	X	X	X	X	X	X	X
2.6b(1)	X				X				X			
2.6b(2)		X				X				X		
2.6b(3)			X				X				X	
2.6b(4)				X				X				X
2.7	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
3.1									X	X	X	X
3.2					X	X	X	X				
4.	X	X	X	X	X	X	X	X	X	X	X	X
5.1	X	X	X	X	X	X	X	X				
5.2 and/or 5.3									X	X	X	X

(1)* Description on Certificate will indicate extent of recording provided, if any.

Initials of Region Materials Engineer or Designated Representative _____

3. Central Mix Operations

3.0 Central Mix / Shrink Mix

3.1 Definition: Stationary mixer installed at the plant for the purpose of mixing the concrete completely (Central Mix) or partially (Shrink Mix).

For Central Mixing Operations, the mixer at the plant shall be:

3.1a	Capable of producing uniform concrete (See Note 19) in the mixing time regularly employed at the plant or in the time designated in ASTM Specification C 94-90 for Ready Mixed Concrete (See Note 20), whichever is less, when operated with a capacity batch in accordance with the method regularly employed in operation of the plant.	☐ Yes ☐ No ☐ N/A
3.1b	Equipped with a timing device that will not permit the batch to the discharged before the predetermined mixing time has elapsed.	☐ Yes ☐ No ☐ N/A
3.2	For Shrink Mixing Operations, the mixer at the plant shall be capable of partially blending the concrete ingredients to reduce their total bulk volume before discharge into a truck mixer.	☐ Yes ☐ No

Note 19:	The concrete is considered uniform if samples taken after discharge of approximately 15 percent and 85 percent of the load do not differ more than the following: (1) in slump, 1 inch of the average slump is 4 inches or less, 1 1/2 inches if the average slump is 4 to 6 inches; and (2) in coarse aggregate content, 6 percent by weight of the concrete.
Note 20:	The mixing time designated in ASTM C 94-90 is 1 minute for mixers with capacities of 1 cubic yard or less plus 15 seconds for each additional cubic yard or fraction thereof.

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4. Ticketing System

4.0 Ticketing System

Provision on delivery ticket for the following information:

4.1	Name of ready-mixed concrete company	☐ Yes ☐ No
4.2	Contracting agency contract number	☐ Yes ☐ No
4.3	Date	☐ Yes ☐ No
4.4	Time Batched	☐ Yes ☐ No
4.5	Truck number or designation	☐ Yes ☐ No
4.6	Initial revolution counter reading	☐ Yes ☐ No
4.7	Quantity	☐ Yes ☐ No
4.8	Type of concrete by class and producer mix design number	☐ Yes ☐ No
4.9	Cement - Producer, Type and Mill Certification Number (See Note 21)	☐ Yes ☐ No
4.10	Flyash (If used) brand and type	☐ Yes ☐ No
4.11	Approved aggregate gradation designations	☐ Yes ☐ No
4.12	Mix design weights per cubic yard and actual weights batched for:	☐ Yes ☐ No
4.13	Cement	☐ Yes ☐ No
4.14	Flyash	☐ Yes ☐ No
4.15	Coarse Concrete Aggregate and moisture content (For each size)	☐ Yes ☐ No
4.16	Fine Aggregate and moisture content	☐ Yes ☐ No
4.17	Water (Including free moisture in aggregate)	☐ Yes ☐ No
4.18	Admixtures brand, quantity per/100 wt., and total quantity batched	☐ Yes ☐ No
4.19	Air Entraining Admixture	☐ Yes ☐ No
4.20	Water Reducing Admixture	☐ Yes ☐ No
4.21	Other admixture(s)	☐ Yes ☐ No

The Certification of Compliance shall be signed by a responsible representative of the concrete producer, other than the driver, affirming the accuracy of the information provided. In lieu of providing a machine produced record containing all of the above information, the concrete producer may use the contracting agency provided printed forms, which shall be completed for each load of concrete delivered to the project.

Note 21: A copy of the applicable cement mill certification shall accompany the certification of compliance with the first load of concrete using cement from the identified shipment.

Initials of Region Materials Engineer
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5. Delivery Fleet

5.0 Delivery Fleet

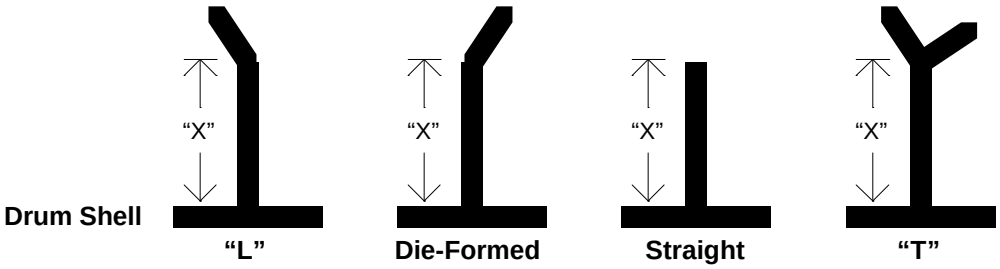
The inspecting Engineer will examine and evaluate all truck mixers, agitators and non agitating units used to deliver concrete from the plant for conformance with the requirements given in Sections 5.1, 5.2, and 5.3, respectively. Each unit will be listed in either the acceptable or unacceptable category in the appropriate section of the Inspection Record of Truck Fleet (Section 5.4 on page 13). Agitators and non agitating units are permitted only for central mixing operations. Certification will not be granted if (1) for truck-mixing or shrink-mixing operations, 10 percent or more of the truck mixers are listed as unacceptable; or (2) for central-mix operation, 10 percent or more of the total agitators and non agitating units are listed as unacceptable. It is assumed that purchasers of concrete will forbid delivery in units which are allowed to remain defective, but will permit use of new units added to the delivery fleet or units restored to acceptable condition subsequent to execution of the check list. It is assumed that units qualifying as truck mixers will also qualify as agitators.

5.1 Truck Mixers - Transit Mix Plants

Definition: Concrete mixers mounted on trucks or other vehicles, used for the complete mixing of concrete ingredients after they have been batched at the plant.

Each Applicable truck mixer shall conform with the following requirements:

5.1a Interior condition satisfactory: No appreciable accumulation of hardened concrete; blades free of excessive wear. Blade wear shall be checked at the point of maximum drum diameter nearest to the drum head. When the height of the blade at this point, measured from the drum shell, is less than 90 percent of the original radial height (dimension "X" in sketch of the applicable blade type), the blade is considered excessively worn. The manufacturer of the mixer will furnish original blade dimensions on request. ☐ Yes ☐ No



5.1b Charging and discharge opening and chute in good working condition; free from appreciable accumulations of cement or concrete; hopper and chute surfaces clean and smooth. ☐ Yes ☐ No

5.1c Drum or container of such size that the rating as a mixer (In volume of mixed concrete) does not exceed 63 percent of the gross volume of the mixer, disregarding blades. (This requirement is met by all mixers carrying a legible rating plate of the Truck Mixer Manufacturers Bureau.) ☐ Yes ☐ No

5.1d Provide an legible rating plate showing the mixer manufacturer's recommended operating speed for mixing, which must be in the range of not less than 4 nor more than 22 rpm; demonstrate capacity to operate satisfactorily at recommended speed. ☐ Yes ☐ No

5.1e Equipped with a counter in working condition to indicate the number of revolutions of the drum or blades. ☐ Yes ☐ No

5.1f On units equipped to batch mixing water, equipment to be in proper working condition; gauge glasses or mater meters clean and legibly graduated; water pump or injection system in good working condition with nozzles unobstructed and without leakage into mixer; water measurement spot-checked and found accurate within ± 1 percent of mixing water capacity or ± 1 gallon (See Note 6, page 5), whichever is greater. ☐ Yes ☐ No ☐ N/A

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5. Delivery Fleet

5.0 Delivery Fleet (Continued)

5.2 Agitators - Central Mix Plants

Definition: Drums or container, mounted on trucks or other vehicles, in which central-mixed concrete is kept sufficiently in motion during delivery to prevent segregation.

Each acceptable agitator shall conform with the following requirements:

5.2a	Interior condition satisfactory: No appreciable accumulation of hardened concrete.	☐ Yes	☐ No	☐ N/A
5.2b	Charging and discharge opening and chute in good working condition: free from appreciable accumulations of cement or concrete; hopper and chute surfaces clean and smooth.	☐ Yes	☐ No	☐ N/A
5.2c	Drum or container of such size that the rating as an agitator (in volume of mixed concrete) does not exceed 80 percent of the gross volume of the container, disregarding blades. (This requirement is met by all mixers carrying a legible rating plate of the Truck Mixer Manufacturers Bureau.)	☐ Yes	☐ No	☐ N/A
5.2d	Provide an legible rating plate showing the mixer manufacturer's recommended agitating speed which must not exceed 6 rpm; demonstrate capacity to operate satisfactorily at recommended speed.	☐ Yes	☐ No	☐ N/A
5.2e	Equipped with a counter in working condition to indicate the number of revolutions of the drum or blades.	☐ Yes	☐ No	☐ N/A

5.3 Non Agitating Units - Central Mix Plants

Definition: Drums or container, mounted on trucks or other vehicles, not constructed or equipped to keep the mass of central-mixed concrete in motion within the container.

Each acceptable non agitator unit shall conform with the following requirements:

5.3a	Interior surface smooth and watertight, with rounded corners.	☐ Yes	☐ No	☐ N/A
5.3b	Gates or other means provided to control the concrete discharge.	☐ Yes	☐ No	☐ N/A
5.3c	Interior free from appreciable accumulations of hardened concrete and from other obstruction or deterioration that would interfere with proper discharge of concrete.	☐ Yes	☐ No	☐ N/A

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5. Delivery Fleet

5.4 Inspection Record of Truck Fleet

5.4a Total number of units available for use (See Note 22): _____

5.4b Number of units checked and found acceptable: _____

5.4c Number of units checked and found unacceptable: _____

Transit Mixers and Agitating Units

Truck Number or Designation	Capacity of Transit Mixer		Certified Water Meter		Water Sightglass Gauge		Operable Revolution Counter		Manuf.'s Rating Plate		Drum Clean of Buildup		Blade Height in Spec.		Unit Acceptable
Reference (Note 23)	*Sec. 5.1, 5.2*		*Sec. 5.1f*		*Sec. 5.1f*		*Sec. 5.1f*		*Sec. 5.1d*		*Sec. 5.1a*		*Sec. 5.1a*		*Note 24*
	Mixer	**Agitator**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	
															☐ Yes ☐ No
															☐ Yes ☐ No
															☐ Yes ☐ No
															☐ Yes ☐ No
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															☐ Yes ☐ No
															☐ Yes ☐ No
															☐ Yes ☐ No

Note 22: Available Units are those which the producer wishes to use for delivery to Agency Projects. Number of units listed in the tabulation must agree with totals above.

Note 23: By reference to check list paragraph number.

Note 24: Any "No" must be documented as to condition of deficiency.

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Agreement to Regularly Check Scales and Volumetric Batching Devices and Dispensers

To be completed by ready mixed concrete company official

The undersigned agrees that all scales in the plant described below will be checked at intervals not exceeding 6 months for conformance with Section 2.1b of the **Concrete Batch Plant Inspection Check List**. Any failure to meet the scale tolerance (± 0.20 percent of scale capacity throughout the range of use) will be corrected promptly. If correction is delayed for any reason, batch weights of any concrete delivered will be adjusted to assure positively against a deficiency in unit cement content or an excess in water-cement ratio.

The undersigned also agrees that the batching accuracy of all volumetric admixture dispensers and all volumetric water batching devices (including water meters) in the plant will be checked at intervals not exceeding 6 months for conformance with the batching accuracy requirements for liquid admixtures and water contained in Sections 2.5c and 2.5d of the Check List. Any failure to meet the batching accuracy will corrected promptly. (Checks may be made by qualified company personnel or by outside agencies or scale checking companies.)

Signature of Company Official _____ Date _____

Printed Name and Title _____

PlantDesignation _____

Plant Location _____

City _____ State _____ Zip Code _____

Company Name _____

Company Address _____

City _____ State _____ Zip Code _____

Initials of Region Materials Engineer
or Designated Representative _____